

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

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January 17, 2018

Thomas DiPlacido
850 Franklin Street, Suite 8
Wrentham, MA 02093

City/Town:	Norfolk
Re:	Hydrogeologic Report
Program Identifier:	BRP WP 83
Transmittal No. :	X277029
Facility Name:	Abbyville Commons/The Preserve at Abbyville
Authorization Type:	Approval

Dear Mr. DiPlacido:

The Massachusetts Department of Environmental Protection ("MassDEP") has completed its review of the above referenced hydrogeologic evaluation report dated December 15, 2017 that was submitted on your behalf by GeoHydroCycle, Inc ("GHC"). The report is titled as follows: "Hydrogeologic Evaluation Report, Abbyville Commons/The Preserve at Abbyville, Lawrence Street, Norfolk, MA 02056, #X277029". The report summarizes the hydrogeologic findings of the subsurface investigation at Lawrence Street (the "Site") to support a future groundwater discharge permit application. A scoping meeting was held at MassDEP Central Regional Office on January 15, 2016 with a follow up meeting held on September 21, 2017. The hydrogeologic evaluation was conducted in accordance with the revised scope of work submitted by GeoHydroCycle dated September 13, 2017 and approved by MassDEP via email on October 12, 2017. Notice of the availability of the scope of work was previously published in the Environmental Monitor on December 23, 2015.

The Site is located in Norfolk at 17 Lawrence Street and within a delineated Zone II sensitive area. The Zone II is associated with the Town of Franklin's public water supply sources (PWS #2101000-04G, GP Well 4, and 2101000-05G). The Site will be served by Norfolk's municipal water supply.

The hydrogeologic evaluation was conducted to support development of the Abbyville Commons/The Preserve at Abbyville for residential use. The Site is generally an undeveloped forested land with sharply rolling topography that is characterized by long winding ridges of stratified sand and gravel. The Site is further described as approximately 203 acres of land, of which only a total of approximately 56 acres will be developed to create a cluster developments consisting of a total of 204 residential units within two projects which abut one another. The remainder of the land will remain as open space. The purpose of this investigation was to determine if the Site could accept the proposed discharge of 64,000 gallons per day (gpd) of treated wastewater to the ground via a soil absorption system ("SAS") comprised of 39,327

This information is available in alternate format. Contact Michelle Waters-Ekanem, Director of Diversity/Civil Rights at 617-292-5751.

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square feet of area based on a loading rate of 1.63 gpd/sf. The discharge of treated wastewater will be authorized through a groundwater discharge permit, 314 CMR 5.00 Groundwater Discharge Permit Program.

The Site will serve two projects: Abbyville Commons and the Preserve at Abbyville. Abbyville Commons will be comprised of 56 rental units consisting of (12) 1-bedroom units, (40) 2-bedroom units, and (4) 3-bedroom units. The Preserve at Abbyville will be comprised of 148 individually owned homes consisting of (32) 2-bedroom homes, (60) 3-bedroom homes, and (56) 4-bedroom units. Total combined design flow based on bedrooms is 62,920 gpd.

Subsurface explorations included test pit excavations witnessed by GHC and MassDEP staff on February 12, 2016; and October 18 and 19, 2017. Percolation tests were also conducted at this time within or adjacent to the footprint of the proposed SAS. Most percolation tests were observed to infiltrate at less than 2 minutes per inch (mpi) with one test at less than 5 mpi. Soil mottling for groundwater elevation determination was not encountered in any of the test pits.

A total of seven monitoring wells were installed during March 16-17, 2016 and November 9-13, 2017 using a hollow stem auger. Soils encountered during the drilling were primarily fine to course sands and gravels. GHC used aquifer slug tests to estimate the hydraulic conductivity of the overburden aquifer beneath the proposed SAS. Results of the analyses yield values of hydraulic conductivity ranging from 1,722 and 958 feet per day for sample CAQ-1 and 22.1 feet per day for sample CAQ-2. A geometric mean hydraulic conductivity was calculated at 38.4 feet per day for the esker sands.

To assess impacts to Franklin's Mill River public wells and the potential water supply test wells, GHC conducted a time of travel analysis. Franklin's wells are 6,740' north of the discharge and the new test wells are 1,730' north of the discharge. The time of travel to Franklin's well and the test wells are 3.61 years and 1.09 years respectively.

GHC used the Frimpter method to estimate seasonal high groundwater at the Site. The Frimpter results indicate that the groundwater elevations measured on November 15, 2017 were 4.60 feet below seasonal high groundwater. The water levels were adjusted by GHC by adding the 4.60 feet to the groundwater data; therefore, the adjusted seasonal high groundwater elevation ranged from 165.44' in MW-12 to 167.94' in MW-13'.

MODFLOW ® was utilized for groundwater mounding analysis based on the following input values:

Mounding time:	90 days
Saturated thickness:	12.1'
Hydraulic conductivity:	38.4' per day
Model recharge rate:	80%: 0.174758 cubic feet per day per square foot
Model SAS area:	39,168 s.f.
Disposal rate:	51,200 gpd (total) (80% of 64,000gpd)

The results of MODFLOW groundwater mounding simulation indicate that the increase in groundwater elevations due to the application rate of wastewater into the SAS would cause a mound height of 5.6' beneath the larger of the two proposed leach fields. Superimposing the mounding on the seasonal high groundwater elevations yields a predicted mounded groundwater elevation beneath the leach field of 173.8 feet beneath the larger of the two leach fields. The bottom of the proposed leach field must be 4' above the mounded seasonal high groundwater elevation which calculates to 177.8 feet. This elevation is more than 20' below the current ground surface.

The evaluation report also included a groundwater monitoring plan that outlines the procedures for the long-term monitoring of groundwater quality in the vicinity of the proposed soil absorption system. The plan proposes a monitoring well network that consists of three monitoring wells. Monitoring well (UCW-1) will be upgradient capable of assessing ambient groundwater conditions at the site. Monitoring wells (DCW-2 and DCW-3) are downgradient of the proposed discharge site.

Pursuant to 314 CMR 5.09(1)(f), MassDEP hereby **approves** the hydrogeologic evaluation and authorizes the applicant to apply for an Individual Groundwater Discharge Permit (BRP WP 79) subject to the following conditions:

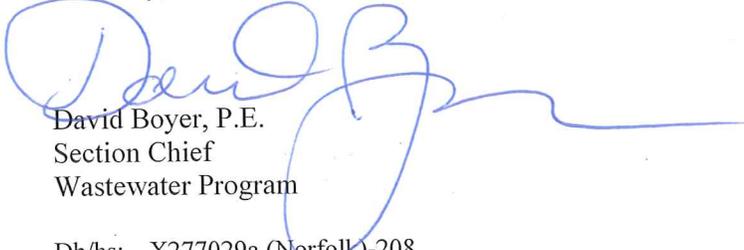
1. The design flow of the proposed groundwater discharge shall not exceed 64,000 gpd.
2. The long term application rate to the SAS shall not be greater than 1.63 gallons/day/square foot.
3. The proposed SAS shall not be constructed until a Groundwater Discharge Permit has been obtained from MassDEP. The proposed SAS shall be constructed within the footprint depicted on Figure 2B "Site Features" within the evaluation report. The lateral footprint of the final disposal area cannot change from what was presented in the report.
4. Due to the site's varying topography it is likely a considerable amount of cut/fill activities will be performed during development. Acceptable material shall be used for the siting of the discharge. A final as built, location and elevation map be produced of the wells to be used in the compliance monitoring program. These shall be approved as part of the future permitting process. A monitoring program for the NHESP Certified Vernal Pool located off-site southeast of the leach fields at 920 feet (nearest of 2 pools) shall be proposed and evaluated along with the compliance monitoring well submittal.
5. MassDEP approves the monitoring well locations proposed and as shown on Figure 13. "Proposed Locations of Compliance Wells" within the evaluation report. The proposed well locations and the approved monitoring plan will be referenced in the Groundwater Discharge Permit when issued. MassDEP recognizes that proposed locations are somewhat dependent upon final site development (e.g. building and road placement) and may require modification, however changes must be submitted to this office for approval prior to well installation. Final monitoring wells must be installed and sampled for all groundwater quality parameters listed in the issued permit no later than 90 days prior to startup of the wastewater treatment plant and discharge to the SAS.
6. Proper separation as previously described is maintained from the seasonal high groundwater elevation with mounding superimposed and the footprint of the final disposal area.
7. An Initial Groundwater Monitoring Well and Groundwater Quality Report must be submitted to this office prior to any discharge of wastewater. This report must include;
 - a. a final surveyed site plan with the location of the SAS, all monitoring wells and all appropriate elevation data,
 - b. boring logs and well construction details for all monitoring wells, and
 - c. The analytical results of the groundwater samples collected from the final groundwater monitoring wells. These results will establish the baseline groundwater quality for the site.

Please be advised that this approval is **not** a Groundwater Discharge Permit. It does, however, authorize the project proponent to submit an Individual Groundwater Discharge Permit application for the discharge described at the evaluated location. MassDEP requires that the Individual Groundwater Discharge Permit application (BRP WP 79) be accompanied by a MassDEP Transmittal form and include all required supporting documentation. Included in the supporting documentation shall be a certification from a Massachusetts Registered Professional Engineer that the approved Hydrogeological Report has been reviewed and accurately reflects site conditions as of the date of the permit application. Information on

any changes noted during the review shall be included in the Engineering Report that accompanies the application. Please be advised, the submittal of plans and specifications may be required at any time during the review of the permit application.

Questions regarding this evaluation and approval may be directed to Steve Hallem at (617) 292-5681 or at stephen.hallem@state.ma.us.

Sincerely,



David Boyer, P.E.
Section Chief
Wastewater Program

Db/hs: X277029a (Norfolk)-208

Cc: Norfolk Board of Health

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